SPEED DOME CAMERA
Samsung-T Protocol User's Manual

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Preface

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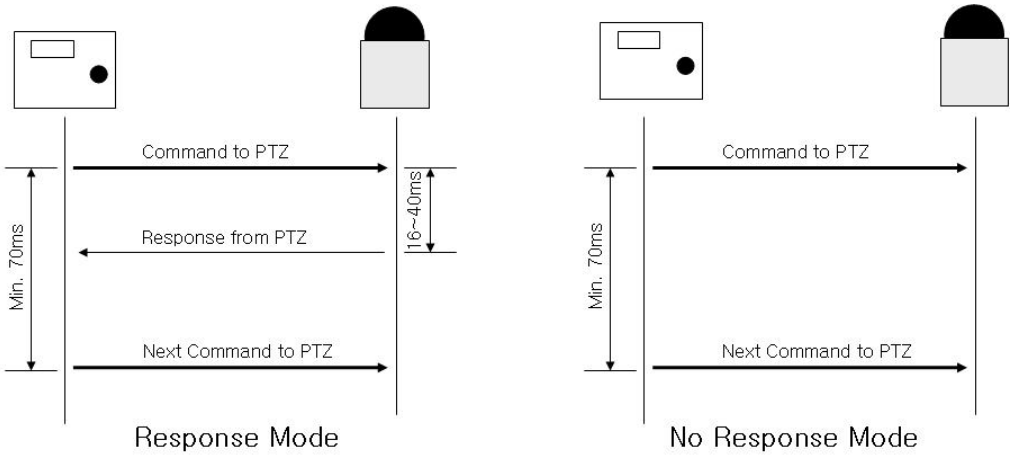
1.Protocol Frame Structure

1.1 Transmission Packet Format

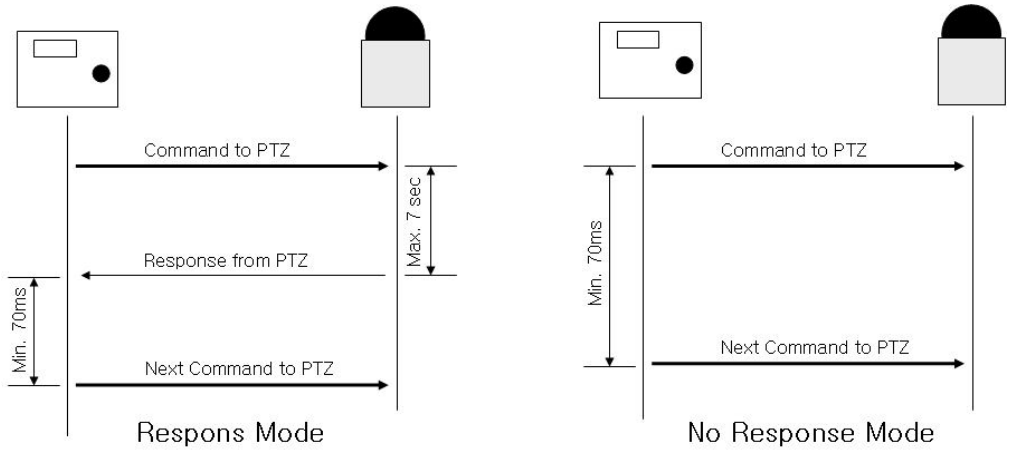
-Mode :RS-485/RS-422 Asynchronous Communication
-Transmit Direction :Simplex/Half duplex
-Start bit :1 bit
-Data bit :8 bits
-Parity bit :None
-Stop bit :1bit
-Baud rate :9600 bps

1.2.Communication Timing Chart



Pic 1.Pan/Tilt Operation Timing Chart

Please note that the Preset commands send a response only at the end of their executions. The recommended minimum period of control signal communications is 70ms.
For the Pan/Tilt operation, setting up the communication period shorter than the recommendation may cause protocol loss or extend the response time of the camera.



Pic 2. Other Commands Timing Chart

Aside from Pan/Tilt, other protocols send a response at the end of their executions depending on the situation; the response time of the camera may take up to 7 seconds.

1.3.Transmission Packet Format

<Command Packet Format>

Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8	Byte9	Byte10	Byte11
STX	Cam ID	Host ID	Cmd1	Cmd2	Data1	Data2	Data3	Data4	ETX	Checksum

-STX(Start of Text): A0h
-ETX(End of Text): AFh
-Cam ID: Dome ID(01h~FFh)
-Host ID: Host Controller ID(default:00h)
-Checksum: The value of Modulo 256 equal to a total of Byte2 to Byte9
processed by 'Logical Not(~)'
Checksum = ~((Byte 2 +……+ Byte 9) & FFh)

<Return Packet Format>

Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte 8	Byte9	Byte10	Byte11
STX	Host ID	Cam ID	Cmd1	Cmd2	Data1	Data2	Data3	Error	ETX	Checksum

-Host ID:Controller ID
-Cam ID:Dome ID Number
-Error:Bit error codes are listed in the chart below.

	Description
bit7	
bit6	
bit5	Camera Module Failure
bit4	Pan/Tilt Failure
bit3	RAM of EEPROM Error
bit2	
bit1	
bit0	Unsuitable Data

2.Command

2.1 Pan/Tilt/Zoom/Focus/Brightness

Cmd1	Cmd2	Data1	Data2	Data3	Data4
Direction1	Direction2	Pan Speed	Tilt Speed	Zoom Speed /Focus Speed	XXh

The frame above is located at Byte4 to Byte9 in the command packet.

-Direction1~2 :

Direction1 is to process the Brightness and Focus commands.

Command1							
bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
*	*	*	Brighter	Darker	*	Focus Near	Focus Far

Diredtion2 is to process the Zoom, Pan and Tilt commands as shown in the chart below.

Command2							
bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
	Zoom Wide	Zoom Tele	Tilt Down	Tilt Up	Pan Left	Pan Right	always 0

Note: For these commands, bit0 must be retained as '0' at all times. Changing it to '1' fails to execute the commands shown in the chart above.

The speed of Pan, Tilt, Zoom, and Focus is available as shown below.

-Pan: 00h~3Fh

-Tilt: 00h~3Fh

-Zoom: 01h~08h

-Focus: 10h~80h

Note: The function of Zoom/Focus Speed, depending on the product, can not be supported.

Important!: The Zoom and Focus commands cannot be transmitted simultaneously.

2.2 OSD Menu Control

2.2.1 OSD(On Screen Display) Menu On:

Cmd1	Cmd2	Data1	Data2	Data3	Data4
00h	B1h	00h	00h	00h	00h

2.2.2 OSD Menu Off

Cmd1	Cmd2	Data1	Data2	Data3	Data4
00h	B1h	01h	00h	00h	00h

2.2.2 Menu Enter

Cmd1	Cmd2	Data1	Data2	Data3	Data4
01h	00h	06h	00h	00h	00h

*The Focus command may be activated automatically in Normal (non-OSD Menu) mode.

2.2.3 Menu Cancel(Esc)

Cmd1	Cmd2	Data1	Data2	Data3	Data4
02h	00h	07h	00h	00h	00h

*The Focus command may be activated automatically in Normal (non-OSD Menu) mode.

2.3 Preset Control

2.3.1 Set Preset (Saves preset commands.)

	Cmd1	Cmd2	Data1	Data2	Data3	Data4
Send	00h	03h	P1	00h	00h	00h
Receive	"	"	"	"	"	Error

P1:Preset Number=0~FEh

2.3.2 Clear Preset (Deletes preset commands.)

	Cmd1	Cmd2	Data1	Data2	Data3	Data4
Send	00h	05h	P1	00h	00h	00h
Receive	"	"	"	"	"	Error

P1:Preset Number=0~FEh

2.3.3 Goto Preset (Call saved preset commands.)

	Cmd1	Cmd2	Data1	Data2	Data3	Data4
Send	00h	07h	P1	00h	00h	00h
Receive	"	"	"	"	"	Error

P1:Preset Number=0~FEh

The SPD-3300/3000/1000 supports these commands only from 0 to 7Fh.

2.4 Product Initialization

2.4.1 Pan/Tilt Position Initialization

	Cmd1	Cmd2	Data1	Data2	Data3	Data4
Send	00h	0Dh	00h	00h	00h	00h
Receive	"	"	"	"	"	Error

2.4.1 Zoom Module Motor Position Initialization

	Cmd1	Cmd2	Data1	Data2	Data3	Data4
Send	00h	0Fh	00h	00h	00h	00h
Receive	"	"	"	"	"	Error

2.5 Swing

2.5.1 Set Swing Speed & Time

	Cmd1	Cmd2	Data1	Data2	Data3	Data4
Send	00h	13h	P1	P2	P3h	00h
Return	"	"	"	"	"	Error

P1: 00h=Pan Swing 01h=Tilt Swing 02h=Pan/Tilt Swing

P2: 00h ~ 40h Swing Speed

P3: 00h ~ 7Fh Swing Dwell Time(0 ~ 127sec)

2.5.2 Set Swing

	Cmd1	Cmd2	Data1	Data2	Data3	Data4
Send	00h	19h	P1	P2	P3h	00h
Return	"	"	"	"	"	Error

P1: 00=Pan Swing 01h=Tilt Swing 02h=Pan/Tilt Swing

P2: 00h ~ FEh = First preset position

P3: 00h ~ FEh = Second preset position

2.5.3 Run Swing

	Cmd1	Cmd2	Data1	Data2	Data3	Data4
Send	00h	1Bh	P1	00h	00h	00h
Return	"	"	"	"	"	Error

P1: 00h=Pan Swing 01h=Tilt Swing 02h=Pan/Tilt Swing

2.6 Sequence Command

2.6.1 Run Group

	Cmd1	Cmd2	Data1	Data2	Data3	Data4
Send	00h	21h	P1	00h	00h	00h
Return	"	"	"	"	"	Error

P1: 00h ~ 05h Group number

2.6.2 Run Tour

	Cmd1	Cmd2	Data1	Data2	Data3	Data4
Send	00h	25h	00h	00h	00h	00h
Return	"	"	"	"	"	Error

2.6.3 Clear Tour & Group

	Cmd1	Cmd2	Data1	Data2	Data3	Data4
Send	00h	2Bh	P1	P2	00h	00h
Return	"	"	"	"	"	Error

P1: 00h=Clear the data for Tour 01h=Clear the data for Group

P2: When P1 is 00h; 00h=Tour number F1h=Clear all Tour

When P1 is 01h; 00h~05h=Group number F1h=Clear all Group

2.7 PTZ Trace

2.7.1 Set PTZ Trace

	Cmd1	Cmd2	Data1	Data2	Data3	Data4
Send	00h	71h	P1	P2	00h	00h
Return	"	"	"	"	"	Error

P1: 00h=Memory start 01h=RePlay start 02h=Delete

P2: Pattern No.(0~3)

2.7.2 Stop PTZ Trace

	Cmd1	Cmd2	Data1	Data2	Data3	Data4
Send	00h	73h	00h	00h	00h	00h
Return	"	"	"	"	"	Error

* It can be stopped by the command 'Enter'.

2.8 Set Pan/Tilt Position Move 1(Relative Movement)

	Cmd1	Cmd2	Data1	Data2	Data3	Data4
Send	00h	3Bh	P1	P2	P3	P4
Return	"	"	"	"	"	Error

P1: 00h=Pan 01h=Tilt

P2: 00h=Right(or Down) 01h=Left(or Up)

P3P4: Relative Movement Value (Resolution: 0.1deg)

->P3:High Byte, P4:Low Byte

In case of tilting camera's direction, it is flipped.

(1) When upward, the angle will decrease.

(2) When downward, the angle is going to increase.

2.9 Set Pan/Tilt Position Move 2(Relative Movement)

	Cmd1	Cmd2	Data1	Data2	Data3	Data4
Send	00h	3Dh	P1	P2	P3	P4
Return	"	"	"	"	"	Error

P1: 00h=Pan 01h=Tilt

P2: 00h=Right(or Down) 01h=Left(or Up)

P3P4: Relative Movement Value (Pulse)

->P3:Low Byte, P4:High Byte

In case of tilting camera's direction, it is flipped.

(1) When upward, the angle will decrease.

(2) When downward, the angle is going to increase.

2.10 Special Command

The following special commands are developed in response to SI industrial requests.

In case of Pan/Tilt/Zoom Position Parameter, please refer to Appendix 4.1, 4.2.

STX	Dome ID	Host ID	Cmd1	Cmd2	Data	ETX	CS
0xA0	ID	ID	**E0**	Command	Data1~Data4	0xAF	Check Sum

2.10.1 Call PT Position

	Cmd1	Cmd2	Data1	Data2	Data3	Data4
Send	E0h	01h	00h	00h	00h	00h
Return	"	"	P1	P2	P3	P4

P1P2: Pan Position (Pulse) ->P1:High Byte, P2:Low Byte

P3P4: Tilt Position (Pulse) ->P3:High Byte, P4:Low Byte

2.10.2 Call Zoom Position

	Cmd1	Cmd2	Data1	Data2	Data3	Data4
Send	E0h	02h	00h	00h	00h	00h
Return	"	"	P1	P2	P3	P4

P1P2: Zoom Position (Pulse) ->P1:High Byte, P2:Low Byte

The digital zoom is listed below, in case of model later than SPD-3750/3350/3700/3310 /2700 ver. 1.08, SPU-3750/3700, SCP-2120/3120, SCP-2370/2330/2270/3370, SCU-2370, SCP-2370RH, SCP-2371/2271/3371.

*** In case of the SCP-3120, please refer to Appendix 4.3.**

P3: * Digital Zoom

Digital Zoom Ratio*10 : = 256*10/(P3+1)

ex)P3:E7h → 11(1.1x)

P3:7Fh → 20(2.0x)

In case of older models(SPD-2300/3000/3300, SPD-1000) and a previous ver. (SPD-3750/3350/3700/3310/2700 firmware ver. 1.08 previous model) is listed below.

P3P4: * Digital Zoom 0~3 bit Flip: 4 bit

2.10.3 Call Focus Position

	Cmd1	Cmd2	Data1	Data2	Data3	Data4
Send	E0h	03h	00h	00h	00h	00h
Return	"	"	P1	P2	"	"

P1P2: Focus Position (Pulse)->P1:High Byte, P2:Low Byte

The Focus value may vary depending on the calibration of lens VCLs.

2.10.4 Move Pan & Tilt Position(Absolute Movement)

	Cmd1	Cmd2	Data1	Data2	Data3	Data4
Send	E0h	04h	P1	P2	P3	P4
Return	"	"	"	"	"	"

P1P2: Pan Position(Pulse)->P1:High Byte, P2:Low Byte

P3P4: Tilt Position(Pulse)->P3:High Byte, P4:Low Byte

2.10.5 Move Pan Position(Absolute Movement)

	Cmd1	Cmd2	Data1	Data2	Data3	Data4
Send	E0h	05h	P1	P2	00h	00h
Return	"	"	"	"	"	Error

P1P2: Pan Position(Pulse)->P1:High Byte, P2:Low Byte

2.10.6 Move Tilt Position(Absolute Movement)

	Cmd1	Cmd2	Data1	Data2	Data3	Data4
Send	E0h	06h	00h	00h	P1	P2
Return	"	"	"	"	"	Error

P1P2: Tilt Position(Pulse)->P1:High Byte, P2:Low Byte

2.10.7 Move Zoom Position(Absolute Movement)

	Cmd1	Cmd2	Data1	Data2	Data3	Data4
Send	E0h	07h	P1	P2	P3	00h
Return	"	"	"	"	"	Error

P1P2: Zoom Position ->P1:High Byte, P2:Low Byte

P3: Digital Zoom Position

=(256/Ratio_X)-1

ex) Digital Zoom Ratio:1.1x → P3: E7h

Digital Zoom Ratio:2.0x → P3: 7Fh

The digital zoom is supported in case of model later than SPD-3750/3350/3700/3310/2700 Ver1.08, SPU-3750/3700, SCP-2120/3120, SCP-2370/2330/2270/3370, SCU-2370, SCP-2370RH, SCP-2371/2271/3371.

*** In case of the SCP-3120, please refer to Appendix 4.3.**

2.10.8 Move Focus Position(Absolute Movement)

	Cmd1	Cmd2	Data1	Data2	Data3	Data4
Send	E0h	08h	P1	P2	00h	00h
Return	"	"	"	"	"	Error

P1P2: Focus Position->P1:High Byte, P2:Low Byte

The Focus value may vary depending on the calibration of lens VCLs.

2.10.9 One Shot AF

	Cmd1	Cmd2	Data1	Data2	Data3	Data4
Send	E0h	15h	00h	00h	00h	00h
Return	"	"	"	"	"	Error

2.10.10 Target Lock On

	Cmd1	Cmd2	Data1	Data2	Data3	Data4
Send	E0h	23h	00h	00h	00h	00h
Return	"	"	"	"	"	Error

2.11 Special Command 2

2.11.1 Move PTZ Position and Track On/Off(Abs. position move)

Special Command 2 is the protocol for the Auto Track's function. (In case of model is not have Auto Track function, this protocol is used only for the absolute position moving.)

In case of Pan/Tilt/Zoom Position Parameter, please refer to Appendix 4.1, 4.2.

Note!

This command is a function applied to the Track model and this can be executable after firmware versions as follows.

Model	SPD-37XXT, SPU-3750T	SCP-2370TH/3370TH
Dome Version	v1.20	v1.00_110130
Track Version	v.1.12	v1.00_110316

In case of using the related function with an old version instead of new one, please check the version before the installation in order for avoiding malfunctions.

***Send(14 Bytes)**

1	2	3	4	5	6	7
STX	Dome ID	CMD	Data Size	P1	P2	P3
0xA1	Dome ID	24h	09h	Pan High	Pan Low	Pan Speed

8	9	10	11	12	13	14
P4	P5	P6	P7	P8	P9	C/S
Tilt High	Tilt Low	Tilt Speed	Zoom High	Zoom Low	Action	check sum

P1P2:Pan Absolute Position(Pulse)
P3: Pan Speed(00h~40h)
P4P5:Tilt Absolute Position(Pulse)
P6: Tilt Speed(00h~40h)
P7P8:Zoom Position
P9: 01h=Track On, 00h=Track Off

Checksum: The value of Modulo 256 equal to a sum of Byte2 to Byte11 processed by 'Logical Not(~)'
Checksum = ~((Byte 2 +……+ Byte 11) & FFh)

***Return(11 Bytes)**

Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8	Byte9	Byte10	Byte11
A0h	Host ID	Cam ID	E0h	24h	P1	00h	00h	40h	AFh	Checksum

P1: Action(00h:No Track, 07h:Track On)

2.11.2 Call PTZ Position

In case of Pan/Tilt/Zoom Position Parameter, please refer to Appendix 4.1, 4.2.

Note!

The command can be usable, in case of indicated below models and firmware ver. later.

Model	SCP-2370/3370(H/TH) SCP-2330/2270(H)	SCP-2370RH SCP-2371/2271/3371
Dome Version	v1.02_110726	ALL

In case of using the related function with an old version instead of new one, please check the version before the installation in order for avoiding malfunctions.

1	2	3	4	5
STX	Dome ID	CMD	Data Size	C/s
0xA1	Dome ID	**26h**	0h	Checksum

Checksum = ~((Byte 2 +……+ Byte 4) & FFh)

***Return(14 Bytes)**

Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7
STX	Dome ID	CMD	Data Size	P1	P2	P3
A1h	Host ID	26h	07h	Pan High	Pan Low	Tilt High

Byte8	Byte9	Byte10	Byte11	Byte12
P4	P5	P6	P7	C/S
Tilt Low	Zoom High	Zoom Low	Digital Zoom	Checksum

P1P2 : Pan Absolute Position(Pulse)

P3P4 : Tilt Absolute Position(Pulse)

P5P6 : Zoom Position

P7: Digital Zoom Position

=(256/Ratio_X)-1

ex) Digital Zoom Ratio:1.1x → P3: E7h

Digital Zoom Ratio:2.0x → P3: 7Fh

Checksum: The value of Modulo 256 equal to a sum of Byte2 to Byte11 processed by 'Logical Not(~)'

Checksum = ~((Byte 2 +……+ Byte 11) & FFh)

2.12 New Protocol

The following New protocol are developed in response to SI industrial requests.

Note!

The command can be usable, in case of indicated below models and firmware ver. later.

Model	SCP-2370/3370(H/TH) SCP-2330/2270(H)	SCP-2370RH SCP-2371/2271/3371
Dome Version	v1.02_110726	ALL

In case of using the related function with an old version instead of new one, please check the version before the installation in order for avoiding malfunctions.

2.12.1 Set Home Position

This command is can be set to Home position, and can be used related with Home function of "Autorun".

	Cmd1	Cmd2	Data1	Data2	Data3	Data4
Send	00h	0Bh	P1	P2	00h	00h
Return	"	"	"	"	"	Error

P1	P2
00h=HP Specified	00h~FEh=Preset Number
01h=ON/OFF Specified	00h=OFF / 01h=ON
02h=Specified of Hour	00h=5Sec / 01h=10Sec / 02h=20Sec 03h=30Sec / 04h=1Min / 05h=2Min 06h=3Min / 07h=4Min 08h=5Min(Initial Value=03h)

P1:00h - Set "Home Position"

P1:01h - Set "Autorun" Mode(P2:00h → OFF, 01h → HOME)

P1:02h - Set "Autorun" Time

2.12.2 Call Home Position Status

	Cmd1	Cmd2	Data1	Data2	Data3	Data4
Send	00h	8Bh	P1	00h	00h	00h
Return	"	"	P1	P2	"	Error

P1	P2
00h=HP Specified	00h~FEh=Preset Number FFh=No Registration
01h=ON/OFF Specified	00h=OFF / 01h=ON
02h=Specified of Hour	00h=5Sec / 01h=10Sec / 02h=20Sec 03h=30Sec / 04h=1Min / 05h=2Min 06h=3Min / 07h=4Min 08h=5Min(Initial Value=03h)

2.12.3 Freeze

	Cmd1	Cmd2	Data1	Data2	Data3	Data4
Send	00h	5Dh	02h	P1	00h	00h
Return	"	"	"	"	"	Error

P1: 00h=OFF / 01h=ON

2.12.4 OSD Setting

	Cmd1	Cmd2	Data1	Data2	Data3	Data4
Send	00h	B5h	P1	P2	00h	00h
Return	"	"	"	"	"	Error

P1: 00h=Camera ID 01h=Camera Name02h=Preset Number
03h=Preset Name 04h=Sequence Status 05h=Area Name
06h=PTZ Position

P2: 00h=ON 01h=ON

2.12.5 Text Display Command

Please contact us for more usage.

1	2	3	4	5		N
STX	Dome ID	CMD	Data Size	Data	…	C/S
0xA1	Dome ID	20h	P1	P2	…	Checksum

P1P2: Zoom Position->P1:High Byte, P2:Low Byte

3.Protocol Samples

The following commands are examples of protocols with the camera ID set to 01h.

Command	Protocol	Note
OSD ON	A0 01 00 00 B1 00 00 00 00 AF 4D	Menu ON
One shot AF	A0 01 00 E0 15 00 00 00 00 AF 09	
Call Zoom Pos.	A0 01 00 E0 02 00 00 00 00 AF 1C	
Call Pan Pos.	A0 01 00 E0 01 00 00 00 00 AF 1D	
Set Preset 3	A0 01 00 00 03 02 00 00 00 AF F9	
Call Preset 3	A0 01 00 00 07 02 00 00 00 AF F5	
Zoom Tele	A0 01 00 00 20 00 00 07 00 AF D7	
Zoom Stop	A0 01 00 00 00 00 00 00 00 AF FE	
Pan Right	A0 01 00 00 02 22 00 00 00 AF DA	Speed 34

4.Appendix

4.1.Pan/Tilt/Zoom Position Parameter Per Model

4.1.1 Pan/Tilt Position Range

Model	Pan Range(Pulse)	Tilt Range(Pulse)	Remarks
SPD-2300/3000/3300	0~64000	794~34556	
SPD-1000	0~16851	0~7662	
SPD-3700/3750/3350/3310/2700, SPU-3750T/3700	0~44799	0~23672	
SCP-2120/3120	0~38399	0~16887	
SCU-2370/VAC/9051/VAC1	0~17999(0°~360°) => Position*50	0~2000(0°~40°), 61286~65535(-85°~-0°) => Position*50	
SCP-2370/2330/2270/3370 SCP-2370RH	0~44799	0~23644	
SCP-2371/2271/3371	0~31999	5~18666 (-15°~195°)	

*** Note! Position is the data transformed the hexadecimal to decimal notation.**

4.1.2 Zoom Position Range

Model	Zoom Range(Pulse)	Remarks
SPD-2300	0~1755	23X
SPD-3000/3300	0~1770	30X
SPD-1000	0~1174	10X
SPD-3700/3750, SPU-3750/3700	0~1613	37X
SPD-3350/3310	0~1608	33X
SPD-2700	0~1589	27X
SCP-2120	0~921	12X
SCP-3120	32772~35952	12X
SCU-2370	0~1613	37X
SCP-2370/3370/2371/3371 SCP-2370RH	0~1613	37X
SCP-2330	0~1608	33X
SCP-2270/2271	0~1589	27X

*** Note! Position is the data transformed the hexadecimal to decimal notation.**

4.2.Zoom Ratio Parameter Per Model

4.2.1 Zoom Start Ratio Hexa Table

■ SPD-3700/3750, SPU-3750T/3700, SCP-2370/3370, SCU-2370 : 37X
SCP-2370/3370/2371/3371, SCP-2370RH : 37X
SPD-3350/3310, SCP-2330 : 33X
SPD-2700, SCP-2270/2271 : 27X

x1	0x0000	x11	0x0542	x21	0x0609	x31	0x0643
x2	0x0238	x12	0x055F	x22	0x0613	x32	0x0646
x3	0x032C	x13	0x057A	x23	0x061C	x33	0x0648
x4	0x03BC	x14	0x0593	x24	0x0623	x34	0x064A
x5	0x041E	x15	0x05AA	x25	0x062A	x35	0x064B
x6	0x0468	x16	0x05BE	x26	0x0630	x36	0x64C
x7	0x04A3	x17	0x05D1	x27	0x0635	x37	0x064D
x8	0x04D3	x18	0x05E2	x28	0x0639		
x9	0x04FC	x19	0x05F1	x29	0x063D		
x10	0x0521	x20	0x05FE	x30	0x0640		

■ SCP-2120

x1	0x0000	x5	0x02BD	x9	0x0360
x2	0x0175	x6	0x02F2	x10	0x037A
x3	0x0216	x7	0x031E	x11	0x038E
x4	0x0278	x8	0x0342	x12	0x0399

■ SCP-3120

x1	0x8004	x5	0x893E	x9	0x8B88
x2	0x84DA	x6	0x89FA	x10	0x8BEA
x3	0x86FE	x7	0x8A94	x11	0x8C3C
x4	0x884E	x8	0x8B18	x12	0x8C70

4.3.SCP-3120 Digital Zoom Parameter

Digital Zoom	Position Parameter
1.08	0x0a
1.17	0x15
1.25	0x20
1.33	0x2a
1.42	0x35
1.5	0x40
1.58	0x4a
1.67	0x55
1.83	0x6a
1.92	0x75
2	0x80
2.17	0x87
2.42	0x91
2.58	0x99
2.83	0xa3
3	0xab
3.5	0xb5
4	0xc0
5	0xcd
6	0xd6
7	0xdc
8	0xe0
9	0xe4
10	0xe7
11	0xe9
12	0xeb
13	0xed
14	0xee
15	0xef
16	0xf0